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Performance, Nutrients Digestibility and Cost Analysis of Broiler Chickens Fed Diet Containing Varying Inclusion Levels of Malted *Senna occidentalis* Seed Meal

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Abstract
A total of one hundred and eighty (180) day old Arno chicks were used in a completely randomized design, to determine the performance, nutrient digestibility and cost analysis of broiler chickens fed diet containing varying inclusion levels of malted *Senna occidentalis* meal (MSOM). The treatments consist of a control ,0%, 5.5%, 11.0 % and 16.50% inclusion levels of MSOM diets designated as T1,T2, T3 and T4 respectively, and replicated thrice (3) with fifteen birds per replicate. The parameters evaluated included feed intake, body weight, body weight gain, feed conversion ratio, protein efficiency, energy efficiency, cost analysis and nutrients digestibility. At the end of the experiment, 6 birds were randomly selected from each treatment and housed in a metabolic cage for digestibility trial. Significant differences ($p>0.05$) where observed in all parameters measured. However dietary treatments significantly influence the nutrients digestibility, except the dry matter. There were significant differences ($p>0.05$) in the results of growth performance with the control diets having higher values in terms final weight when compared with other treatments, however broiler chickens fed up to 5.5% MSOSM compared favourably with the control diets in most of the parameters. The feed cost analysis feed cost per kg weight gain tends to decrease as the levels of malted *Senna occidentalis* in the diet of broiler chickens increased. It was therefore concluded that malted *Senna occidentalis* seed meal can be incorporated in the diet of broiler chicken up to 5.5 % without any deleterious effects.

Keywords: Broiler chicken, malted *Senna occidentalis*, cost analysis, graded levels.

Introduction
Poultry is of the quickest sources of meat and its production process involves the least hazardous and arduous in relation to other livestock enterprise. Hence, increase poultry production is one of the surest and quickest ways of bridging the animal protein intake gap between developing countries of the world (Obinne and Okorie, 2008). Emphasis on broiler production should be a key to bridging the protein intake gap. Poultry section constitutes more than 58.7% of the total livestock production in Nigeria (Alabi *et al.*, 2000).Feed is a major problem in poultry production, reducing feed cost is a priority for every poultry farmer and animal nutritionist. Currently, feed ingredients for poultry, especially those for which there is competition with humans, are scarce and expensive (Ologhobo *et al.*, 1993).One of the ways of getting out tothis problem of high feed cost is by looking for alternative feedstuffs, which have little or no dietary value for man and industry. However, some non conventional legume seeds are still under-utilized, which little are known about their chemical composition and nutritional values. (Eugenes and Anthony, 2017). The seeds of sickle pod (*Senna occidentalis*) are one of such seeds, which have good potential as alternative, cost-effective source of protein in monogastric diet, especially broilers. Yahaya (2014) observed that *Senna occidentalis* seeds could serve as a protein rich feed for livestock and birds, having contained crude protein up to 16.04% and 21.80% in raw and malted seed. This qualifies it as an alternative cheaper protein source for broiler chickens.

Materials and Methods
Experimental site: The experiment was conducted at the Poultry Unit of the Department of Animal Production Federal University of Technology, Minna, Niger state. Minna is located between latitude 09° 30'and 09° 45' North and longitude 06° 30' and 06° 45' East. It has an altitude of 1475 meters above sea level and bounded by River Niger running through the North-western part down to the South–Western part of the state.

Collection of seed and processing: Seeds of Negro coffee were collected along road sides in Bida town and undesirable particles such as sand, undersized seeds, and other foreign materials were removed. All sorted seeds were subjected to malting process. The method of Yahaya (2014) was used for malting. In this method, the cleaned seeds were placed in a soaked jute sack after being washed with sodium chloride solution (0.01m) kept at room temperature and moistened at regular intervals of 12 hours for three (3) days.

Experimental animals and management: A total of 180 day old Arno broiler chicks were used, the birds were brooded on deep litter system and a 100 watt bulb was used as the source of heat. The birds were randomly divided into four treatment

groups each group having three (3) replicate with fifteen (15) birds per replicate. All necessary vaccinations were strictly followed throughout the study.

Experimental diets and Treatments: The ground MOSM was mixed into broiler rations at concentration of 0, 5.5, 11.0 and 16.5% designated T1, T2, T3 and T4 respectively. 0%(T1) served as the control. The composition of the experimental diets is presented in Table 1

Chemical and data analysis: proximate composition of the raw and malted Senna were carried out using the standard procedure of analysis described by AOAC (2001) methods. The results of proximate analysis of the seed meal are presented in Table 2. Data obtained were subjected to Analysis of variance (ANOVA) of the completely randomized Design. Duncan Multiple Range Test (Version 17).

Table1 Composition of the experimental diet

Ingredients %	T1 (0 % MSOM)	T2 (5.5 % MSOM)	T3 (11.0% MSOM	T4 (16.5 % MSOM)
Maize	49.70	45.90	42.20	38.80
Maize bran	5.00	5.00	5.00	5.00
Groundnut cake	39.00	37.30	35.50	33.4
MSOM	0.00	5.50	11.0	16.5
Oil	0.30	0.30	0.30	0.30
Fish meal	2.00	2.00	2.00	2.00
Bone meal	2.00	2.00	2.00	2.00
Limestone	1.00	1.00	1.00	1.00
Salt	0.25	0.25	0.25	0.25
Lysine	0.25	0.25	0.25	0.25
Methionine	0.25	0.25	0.25	0.25
Premix	0.25	0.25	0.25	0.25
Total	100.00	100.00	100.00	100.00
Calculated value				
Crude protein (%)	24.02	24.06	24.05	24.02
Energy (kcal/kg ME)	3001.7	3021.92	3042.00	3063.3

Result and Discussion

The result of the growth performance and nutrients digestibility of broiler chickens fed varying inclusion levels of MSOM is presented in table 3 and 4 respectively. The result revealed that all the parameters determined varied significantly ($p>0.05$), the birds fed diets containing 0, 5.5 and 11.0% of MSOM does not differ statistically with the highest feed intake observed in the diet of broiler chickens fed 0% MSOM (1372.76 g), and the least was observed in the diet containing 16.5 % MSOM with the feed intake of (958.27g). The study showed the higher the inclusion level of MSOM in the diet of broiler chickens the lower the feed intake and vice versa, This is in line with the reports of A (Antyev *et al.*, 2017) who reported that the broiler chickens fed diet at 0 and 5% *Senna occidentalis* meal recorded higher feed intake. The highest weight was observed in diet containing 0% MSOM (685.55 g) while the least was observed in the diet containing 16.5 % MSOM (469.87 g). The difference observed might be due to the presence of anti- nutritional factors which may not be completely eliminated after malting. This anti -nutritional factor, May inhibits the utilization of certain essential nutrients and depress feed intake of the birds and subsequently affecting growth. Antyev *et al.* (2017) had reported a similar trend in broiler chickens fed up to 15% of diet contained boiled *Senna occidentalis* meal.

Table 2:Proximatecomposition of raw and malted *Senna occidentalis* seed meal

Nutrient (%)	Raw	Malted
Dry matter	89.00	91.90
Moisture	11.00	8.10
Crude protein	28.00	32.20
Crude fibre	30.67	17.33
Ash	3.00	7.00
Fat	8.11	6.34
NFE	19.22	29.03

The result of the cost analysis revealed that treatment one recorded the highest cost of feed per kg (N180.00/kg) and feed cost per kg weight gain (N377.66/kg) while treatment four recorded the lowest cost in all the cost parameters mentioned above. This finding is similar to the report of Yahaya (2014) who reported birds will consume more to produce a kilogram of live body weight. It was observed that the higher the inclusion levels of MSOM, the lower the cost of formulating a kg of feed. The results of the nutrients digestibility revealed that crude protein digestibility reduced significantly ($p< 0.05$) across dietary treatments with increase in dietary MSOM level, a trend similar to what was reported by Oybode (1998) where growth depression in chicks fed diets containing *Ceibapentandra*Seed cake were observed, which were linked partly to high fibre content of the diets and largely to poor digestion due to residual effects of anti-nutritional factors which did not only bind proteins in diet but also inhibit the action of digestive enzyme on ingested feed

Table 3: Performance of broiler chicken fed diet varying inclusion level of malted *Sennaoccidentalis* (0-4 weeks)

Parameters	T1	T2	T3	T4	SEM	LS
IW (g)/bird	38.16	38.15	38.16	38.17	0.05	Ns
FW g)/bird	685.55^{a}	681.35^{a}	621.89^{b}	469.87^{c}	27.57	*
FI(g)/bird	1372.76^{a}	1366.05^{a}	1270.99^{a}	958.27^{b}	54.79	*
BWG (g)	651.26^{a}	652.27^{a}	550.38^{b}	439.16^{c}	27.17	*
FCR	2.09	2.10	2.30	2.18	0.040	Ns
PER	2.02^{ab}	2.0^{ab}	1.8^{b}	1.9^{ab}	0.049	*
EER	0.3	0.03	0.03	0.03	0.000	Ns
CF/(N/KG)	180.00^{a}	172.33^{b}	162.00^{c}	153.33^{d}	3.09	*
CF/KGWG(N)	377.66^{a}	360.93^{b}	376.3^{a}	340.0^{c}	4.58	*
Mortality%	6.67^{a}	35.55^{b}	39.99^{c}	53.33^{d}	5.34	*

a, b, c, d. Means in the same row with different superscript are significantly different (P>0.05) FCR: Feed conversion ratio, BWG: body weight gain PER: protein efficiency ratio SEM: Standard error of mean, EER: energy efficiency ratio FI: feed intake LS level of significance FW: average final weight; CF: cost of feed, CF/ KGWG cost of feed/kg weight gain:

Table 4: Nutrient digestibility of broiler chicken fed varying inclusion levels of malted *Senna occidentalis* seed meal

Nutrients	T1	T2	T3	T4	SEM	LS
Dry matter	94.65	95.73	94.80	95.02	0.279	Ns
Crude protein	88.10^{a}	80.93^{ab}	75.10^{b}	57.33^{c}	3.66	*
Crude fibre	30.05^{a}	32.30^{a}	27.30^{b}	34.40^{a}	0.746	*
Ash	60.37^{b}	55.73^{b}	60.14^{b}	78.20^{a}	2.94	*
Ether extract	79.93^{ab}	77.50^{b}	87.5^{ab}	89.83^{a}	2.04	*
NFE	61.87^{b}	65.87^{b}	63.87^{b}	72.83^{a}	1.46	*

a,b,c,dMeans in the same row with different superscript are significantly different (p>0.05)

Conclusion

Malted *Senna occidentalis* seed meal can be incorporated at 5.5% dietary level in broiler chicks diets without negative effect on growth performance while the cost analysis increase with decrease levels of MSOM and the Nutrientsdigestibility shows that crude protein, crude fiber, ether extracts, and Ash and nitrogen free extract were significantly affected except the dry matter that was not significantly affected.

Reference

Alabi, R.A., Tariuwa,P.E.A., Mafimisebi, T.A.,Isah, A.O., and Oviasogie, D.I. (2000).Risk management in poultry enterprises in Edo State through insurance Scheme. *Proceedings of the 5th Annual Conference of Animal Science Association of Nigeria, September 19-22, 2000, Port Harcourt, Nigeria.* Pp: 182-184.

Antyev, M., Nyameh, J., Shaahu, D.T., Highest, E.C., Uduak, W, (2017). Performance, carcass characteristics, growth, haematology and serum biochemistry of broiler chickens fed processed *Senna occidentalis* seed meal.

AOAC (2001). Association of official analytical chemists: Official method of analysis (15th edition).K. Heldrich, Virginia. U.S.A.

Eugenes,E.N. and Anthony,(2017). Nutritional evaluation of sickle pod (*Cassia tora*) seed meal in broiler diet. *International Journal of Agriculture, Environment and Bioresearch,*

Obinne, J.I., and Okorie, A.U.(2008). Effect of different crude protein and digestible energy levels on the growth performance of rabbits in the tropics. *Nigeria Journal Animal Production, 35.* 210–216.

Ologhobo, A.D., Apata, A., Oyejide, A. and Akinpelu, R.O. (1993). A Comparison of Protein Fraction Prepared from Lima Beans (*Phaseolus lunatus*) in Starter Diets. *Animal Resources,* 4: 13 – 30.

Oybode, D.O., (1998).Performance of broiler chickens fed kapok (*Ceiba pentandra*) seed cake as replacement for groundnut cake PG thesis submitted to post graduate school, Ahmadu Bello University, Zaria, Nigeria

Yahaya, S.K. (2014). Performance and biochemical profile of wild guinea fowls fed differently processed *Senna occidentalis* seed meal diets under intensive management. Ph.d Thesis, Federal University of Technology,Minna, Nigeria.